

## CLAIMS

What Is Claimed Is:

1. A service brokering apparatus for providing a complex service integrating a plurality of elementary services realized on computers comprising:

means for storing service description information for each elementary service, the service description information comprising a combination of identification information of elementary service entities, declarative description information on information needed to realize the elementary services, and declarative description information on processing results of the elementary services;

means for transmitting and receiving messages; and

means for decomposing the complex service into the elementary services using the service description information upon receipt of a request message for the complex service from the outside, and generating an elementary service request plan comprising strings of combinations of at least elementary service request information needed to realize the complex service, and identification information of elementary service entities.

2. A service brokering apparatus as set forth in claim 1, comprising means for generating the elementary service request plan, then actually requesting an elementary service to an elementary service entity, and compiling the processing results so that the processing results of the complex service are prepared and notified to the requesting outside entity.

3. A service brokering apparatus as set forth in claim 1, comprising means for generating the elementary service request plan, then transmitting the request plan in response to a request for it from the outside.

4. A service brokering apparatus as set forth in claim 1, comprising means for receiving from the outside service description information comprising a combination of identification information of the elementary service entities, declarative description information on information needed to realize the elementary service thereof, and declarative description information on the processing results of the elementary service, and storing the service description information into means for dynamically registering the service description information.

5. A service brokering apparatus as set forth in claim 1, wherein the declarative description information on information needed to realize the elementary service and the declarative description information on the processing results of the elementary service are expressed by classes or objects of an object-oriented language.

6. A service brokering apparatus as set forth in claim 1, comprising ontology storing means for storing definition information on vocabularies used in the declarative description information on information needed to realize the elementary service and the declarative description information on the processing results of the elementary service.

7. A service brokering apparatus as set forth in claim 1, wherein the means for generating the elementary service request plan prepares the elementary service request plan taking into account meta-information describing the nature of the elementary service entity itself, in addition to the declarative description information on information needed to realize the elementary service and the declarative description information on the processing results of the elementary information.

8. A service brokering apparatus as set forth in claim 7, wherein the meta-information used for preparing the elementary service request plan is information on users' access rights to elementary services, information on the line speed or

processing speed of elementary services, or information on the user preference of the elementary services.

9. A service brokering method for providing a complex service integrating a plurality of elementary services realized on computers comprising:

storing for each elementary service, service description information comprising a combination of identification information of elementary service entities, declarative description information on information needed to realize the elementary services, and declarative description information on the processing results of the elementary services; and,

upon receipt of a request message for the complex service from the outside, decomposing the complex service into the elementary services using the service description information, and generating a service request plan comprising strings of combinations of at least elementary service request information needed to realize the complex service, and identification information of elementary service entities.

10. A service brokering program for providing a complex service integrating a plurality of elementary services realized on a computer, the program causing the computer to execute the functions of:

receiving a request message for the complex service from the outside; and

upon receipt of the request message, decomposing the complex service into the elementary services using service description information comprising a combination of identification information of elementary service entities, declarative description information on information needed to realize the elementary services, and declarative description information on the processing results of the elementary services that are stored in advance for each elementary service, and generating an elementary service request plan comprising strings of combinations of at least elementary service request information needed to realize the complex service, and identification information of the elementary service entities.

a complex service integrating a plurality of elementary service by:

receiving a request message for the complex service from the outside; and  
upon receipt of the request message, decomposing the complex service into the elementary services using service description information comprising a combination of identification information of elementary service entities, declarative description information on information needed to realize the elementary services, and declarative description information on the processing results of the elementary services that are stored in advance for each elementary service, and generating an elementary service request plan comprising strings of combinations of at least elementary service request information needed to realize the complex service, and identification information of the elementary service entities.

12. A service integration system comprising:

a user agent;  
a brokering agent; and,  
elementary service agents, connected to each other via a network, for providing a complex service integrating a plurality of elementary services realized on computers,

the brokering agent comprising means for storing service description information comprising a combination of identification information of elementary service entities, declarative description information needed to realize the elementary services, and declarative description information on the processing results of the elementary services,

means for transmitting and receiving messages, and

means for, upon receipt of a request message for the complex service from the user agent, decomposing the complex service into the elementary services using the service description information, and generating an elementary service request plan comprising strings of combinations of at least elementary service request

information needed to realize the complex service, and the identification information of the elementary service entities, and

means for requesting elementary services to the elementary service agents based on the generated request plan, and compiling the processing results so that the processing results of the complex service are prepared and notified to the requesting user agent.

13. A service integration system comprising:

a user agent;

a brokering agent; and,

elementary service agents, connected to each other via a network, for providing a complex service integrating a plurality of elementary services realized on computers,

the brokering agent comprising means for storing service description information comprising a combination of identification information of elementary service entities, declarative description information needed to realize the elementary services, and declarative description information on the processing results of the elementary services,

means for transmitting and receiving messages,

means for, upon receipt of a request message for the complex service from the user agent, decomposing the complex service into the elementary services using the service description information, and generating an elementary service request plan comprising strings of combinations of at least elementary service request information needed to realize the complex service, and the identification information of the elementary service entities, and

means for notifying the generated request plan to the requesting user agent,

the user agent comprising means for requesting elementary services to the elementary service agents based on the request plan generated by the brokering agent.